

CLAIMS

We claim:

1. An apparatus, comprising:

an optical transmitter having a resonance wavelength characteristic that varies with the refractive index of the optical transmitter, wherein the optical transmitter receives a narrow band injected wavelength signal from an incoherent light source;

a controller to substantially match a resonant wavelength of the optical transmitter to the wavelength of the injected wavelength signal by changing the refractive index of the optical transmitter; and

a detector to measure a parameter of the optical transmitter to provide a feedback signal to the controller to determine when the resonant wavelength of the optical transmitter and the wavelength of the injected wavelength signal are substantially matched.

2. The apparatus of claim 1, wherein the optical transmitter having a resonance wavelength characteristic that varies with the refractive index of the optical transmitter is a Fabry-Perot laser diode.

3. The apparatus of claim 2, wherein the controller is an automatic power controller and the detector is a photo-diode, and the an automatic power controller controls the average bias current flowing into the Fabry-Perot laser diode so that an average optical power received at the monitor photo-diode is maintained at approximately a maximum level.

4. The apparatus of claim 1, wherein the optical transmitter having a resonance wavelength characteristic that varies with the refractive index of the optical transmitter is a Fabry-Perot laser diode with antireflective coating on one or more facets of the laser diode.

5. The apparatus of claim 1, wherein the controller changes the operating temperature of the optical transmitter to change the refractive index of the optical transmitter.

6. The apparatus of claim 1, wherein the controller changes the bias current supplied to the optical transmitter to change the refractive index of the optical transmitter.
7. The apparatus of claim 1, wherein the detector is an optical power monitor and the controller is a temperature controller that controls the direction and strength of temperature emitted from a thermo-electric cooler so that an average optical power received at the monitor photo-diode is maintained at approximately a maximum level.
8. The apparatus of claim 1, further comprising:
 - a wavelength division multiplexer to route the narrow band wavelength to the optical transmitter.
9. The apparatus of claim 8, further comprising:
 - a broadband light source to supply a broadband wavelength signal to the wavelength division multiplexer and the wavelength division multiplexer spectrally slices the broadband wavelength signal.
10. The apparatus of claim 8, wherein the wavelength division multiplexer and the optical transmitter are included in a passive optical network.
11. The apparatus of claim 7, further comprising:
 - a power detector to measure bias current supplied to the optical transmitter; and
 - an automatic power controller to control the average bias current flowing into the Fabry-Perot laser diode, wherein the average current flowing into the Fabry-Perot laser diode so that an average bias current supplied to the optical transmitter indicates a decreasing dip from a linear slope of the bias current.
12. A method, comprising:
 - injecting a narrow band wavelength signal from a broadband light source into an optical transmitter having a resonance wavelength characteristic that varies with the refractive index of the optical transmitter;

wavelength locking the resonant wavelength of the optical transmitter to the wavelength of the injected wavelength by shifting a refractive index of the optical transmitter; and

monitoring a parameter of the optical transmitter to provide feedback signal to determine when the resonant wavelength of the optical transmitter and the wavelength of the injected wavelength signal are wavelength locked.

13. The method of claim 12, further comprising:

changing the temperature of the optical transmitter to wavelength lock the resonant wavelength of the optical transmitter to the wavelength of the injected wavelength signal.

14. The method of claim 13, further comprising:

controlling also the bias current supplied to the optical transmitter to wavelength lock the resonant wavelength of the optical transmitter to the wavelength of the injected wavelength signal.

15. The method of claim 12, further comprising:

monitoring the optical power emitted from the optical transmitter to provide a feedback signal to determine when the resonant wavelength of the optical transmitter and the wavelength of the injected wavelength signal are wavelength locked:

16. The method of claim 12, further comprising:

controlling the bias current supplied to the optical transmitter to wavelength lock the resonant wavelength of the optical transmitter to the wavelength of the injected wavelength signal.

17. The method of claim 12, further comprising:

comparing a previous current that had flown into the optical transmitter with the present current flowing into the optical transmitter to provide the feedback signal to determine when the resonant wavelength of the optical transmitter and the wavelength of the injected wavelength signal are wavelength locked.

18. An apparatus, comprising:

means for injecting a narrow band wavelength signal from a broadband light source into an optical transmitter having a resonance wavelength characteristic that varies with the refractive index of the optical transmitter;

means for wavelength locking the resonant wavelength of the optical transmitter to the wavelength of the injected wavelength by shifting a refractive index of the optical transmitter; and

monitoring a parameter of the optical transmitter to provide feedback signal to determine when the resonant wavelength of the optical transmitter and the wavelength of the injected wavelength signal are wavelength locked.

19. The apparatus of claim 18, further comprising:

means for changing the temperature of the optical transmitter to wavelength lock the resonant wavelength of the optical transmitter to the wavelength of the injected wavelength signal.

20. The apparatus of claim 18, further comprising:

means for monitoring the optical power emitted from the optical transmitter to provide feedback signal to determine when the resonant wavelength of the optical transmitter and the wavelength of the injected wavelength signal are wavelength locked.

21. The apparatus of claim 18, further comprising:

means for controlling the bias current supplied to the optical transmitter to wavelength lock the resonant wavelength of the optical transmitter to the wavelength of the injected wavelength signal.